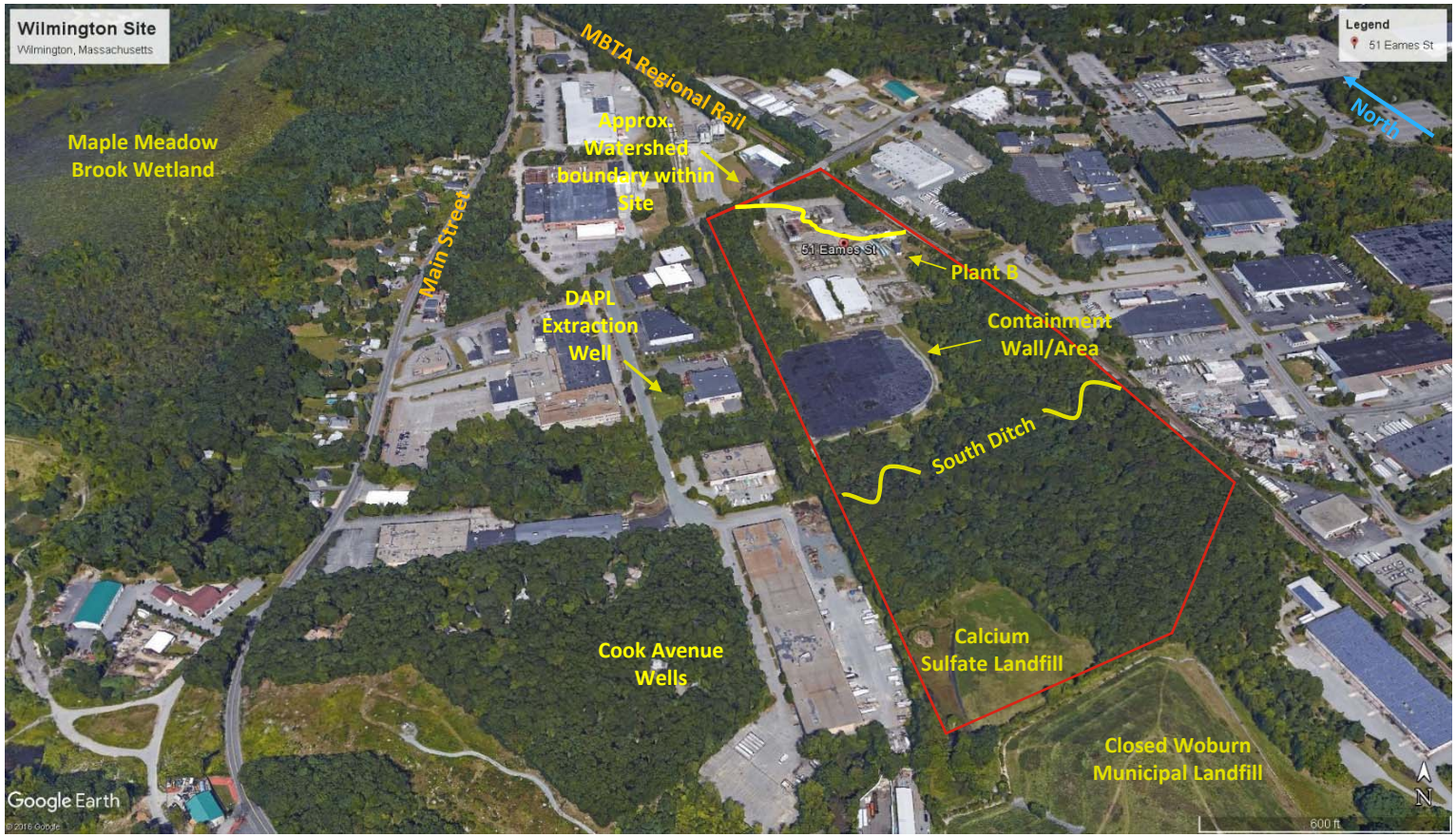
Environmental Remediation Group

WILMINGTON Meeting

March 2019

Wilmington Site Map



IAFS Schedule

- **December 10th – Proposed path forward**
  - Development of IAFS to address DAPL pool and "hot spot" groundwater (11,000 ng/L)
- **February 20th – Conference Call – Discussed sources to be included in IAFS – IAFS by April 11, 2019**
  - Main Street, OPWD, Containment Area DAPL pools
  - LNAPL at Plant B
  - "Hot spot" groundwater (11,000 ng/L)
- **March 15th – Annotated IAFS outline – Follow-On from USEPA response to RI/FS RTC**
  - All of the above plus Containment Area soils
- **March 22nd – EPA comments on Annotated IAFS Outline**
  - All of the above PLUS: Groundwater (south ditch), Surface Water, Sediment, Plant B shallow groundwater, TMP area (VI)
- **No longer an IAFS – site-wide FS minus downgradient, overburden groundwater**
- **Schedule:**
  - **IAFS as originally Planned – April 11, 2019**
  - **IAFS with all EPA additional – 70 to 90 additional days**

Main Street DAPL – CSM Differences

Olin CSM

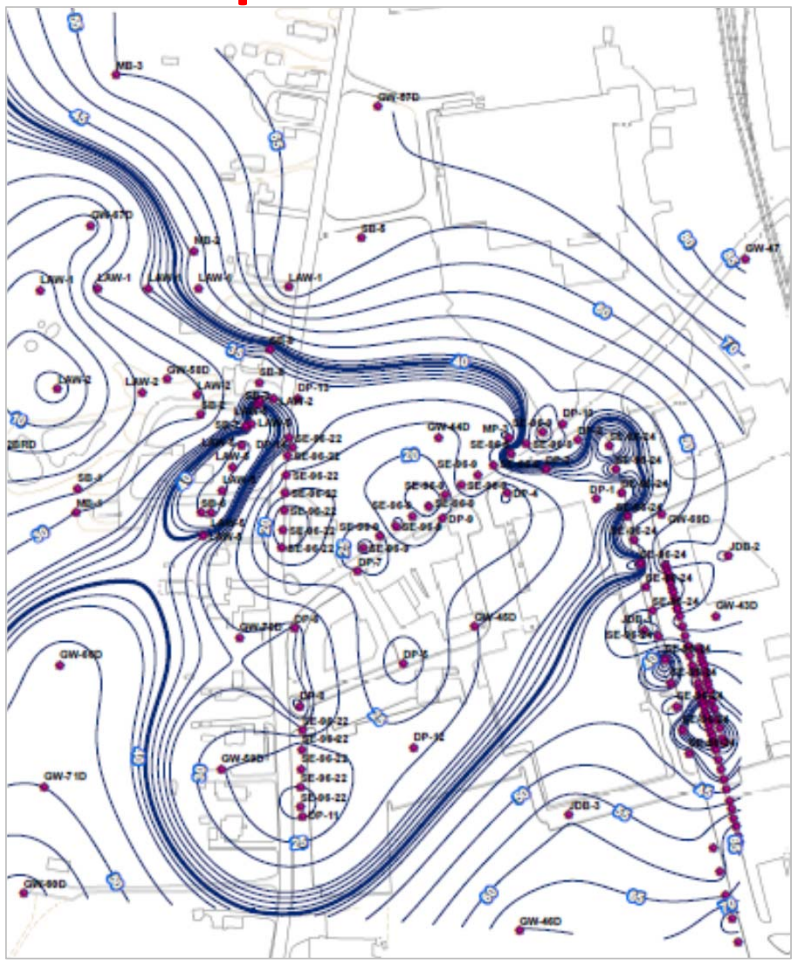
- A bedrock saddle that is acting as a barrier and negates DAPL migration
- Data density allows good interpolation of bedrock elevations and DAPL pool geometry
  - One DAPL pool with uniform elevation
  - DAPL measurements accurate and repeatable

USEPA CSM

- A “Spillway” cuts through the Ridge and Saddle
- Insufficient data density – Bedrock elevation uncertain and ultimately DAPL geometry
  - Multiple (“mini”) pools with different elevations
  - DAPL elevation measurements unreliable

Main Street DAPL Pool CSM – Bedrock Interpretation

- Olin current interpretation of Top of Bedrock
  - 20+ years of data – All data honored as is [Computer kriging of bedrock surface contours without human bias]
  - >100 seismic data points; 13 direct push Geoprobes; 22 wells; 13 borings
- DAPL measurements
  - Observed DAPL surface elevation
  - Data density allows good interpolation of DAPL pool geometry
  - DAPL elevation measurements are accurate (multiple lines of evidence) and highly repeatable
    - One DAPL Pool with uniform elevation



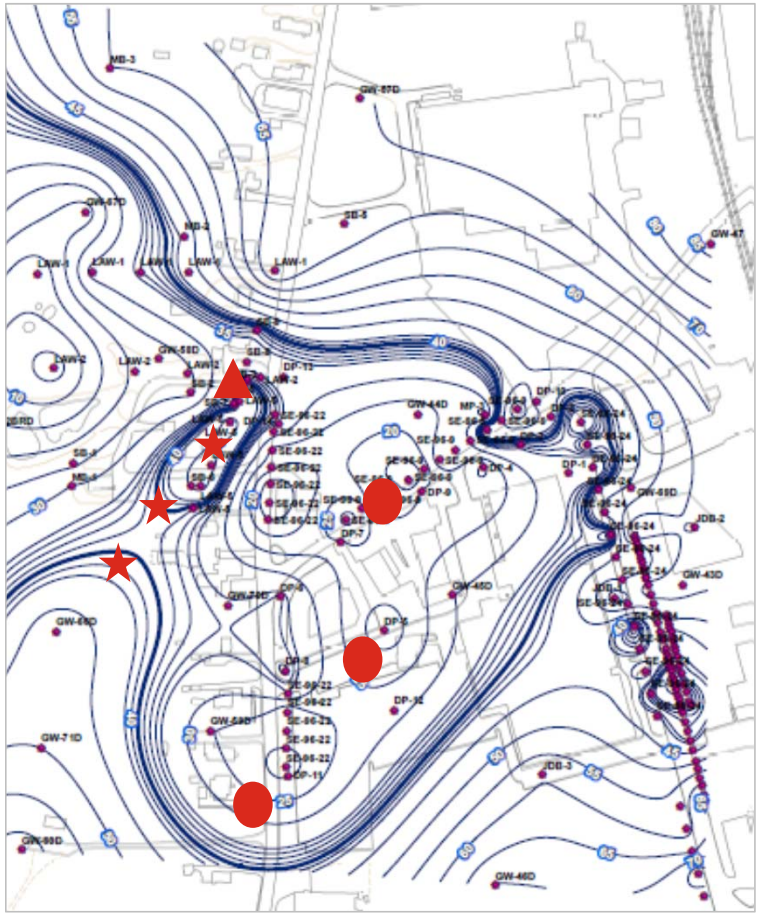
Multiple Lines of Evidence Support the Extent of DAPL in the Pools

- **Top of DAPL**
  - A decade of inductance logs show consistency in the response
  - The specific gravity data is broadly consistent and compatible with the inductance logs
  - The DAPL chemistry is internally consistent over the years
  - Pumping of the Off-Property DAPL pool has had the predicted drawdown/response (speaks to measurement accuracy of the DAPL/diffuse layer cutoff)

- **Bedrock**
  - The geoprobes provide a better delineation of the base of bedrock
  - The seismic lines show general concurrence with the bedrock bores
  - The geoprobes bedrock data are well-correlated with the bedrock elevations (+/- 2 ft)
  - Monitoring wells in the pools help to further define the bedrock elevations

Main Street DAPL Pool CSM – Proposed Supplemental Investigations

- Potential existing data gaps
  - Verification of top of bedrock near western portion of Main Street DAPL pool
    - 4 proposed additional locations (one suggested by USEPA in its November 29 letter)
    - Locations also serve to address “data density” concerns; verify presence/absence of “spillway”
  - Verify “low bedrock spots” and presence or absence of “mini pools” within Main Street DAPL pool
    - 3 multi-level monitoring wells
- Proposed locations to be mutually agreed upon



Bedrock Boring to verify saddle

Bedrock borings to verify bedrock ridge

Bedrock Boring Multilevel Well

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Discussion

Off-Property West Ditch (OPWD) Street DAPL – CSM Differences

Olin CSM

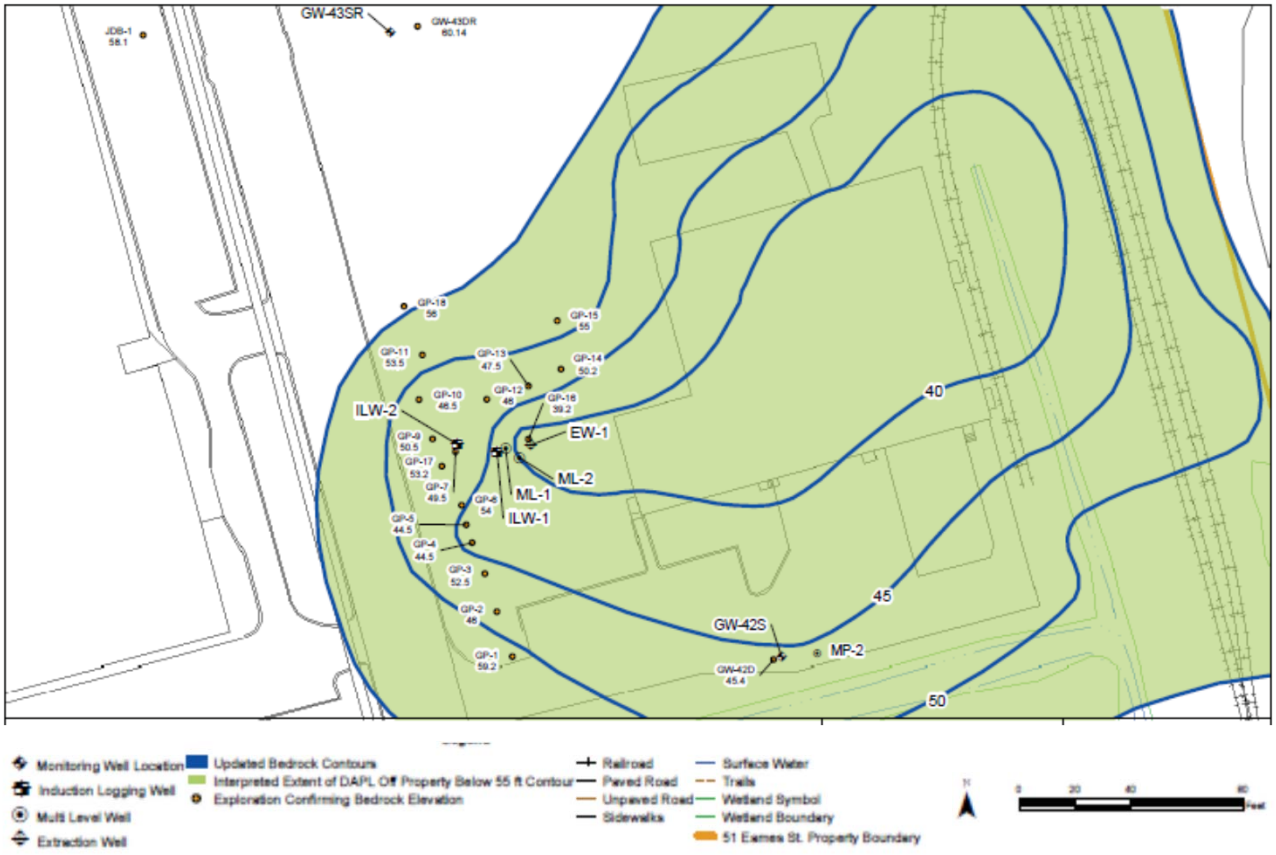
- Multiple lines of evidence show current understanding of DAPL pool geometry and volume is reasonable
- Current EW-1 Location adequate for ongoing system operations
  - Existing buildings/features may limit installation of other wells
  - A shorter well screen will promote more efficient DAPL extraction

USEPA CSM

- DAPL pool geometry not clearly understood – additional investigation needed to better define bedrock surface
- Additional Wells for DAPL Extraction
  - A shorter well screen will promote more efficient DAPL extraction

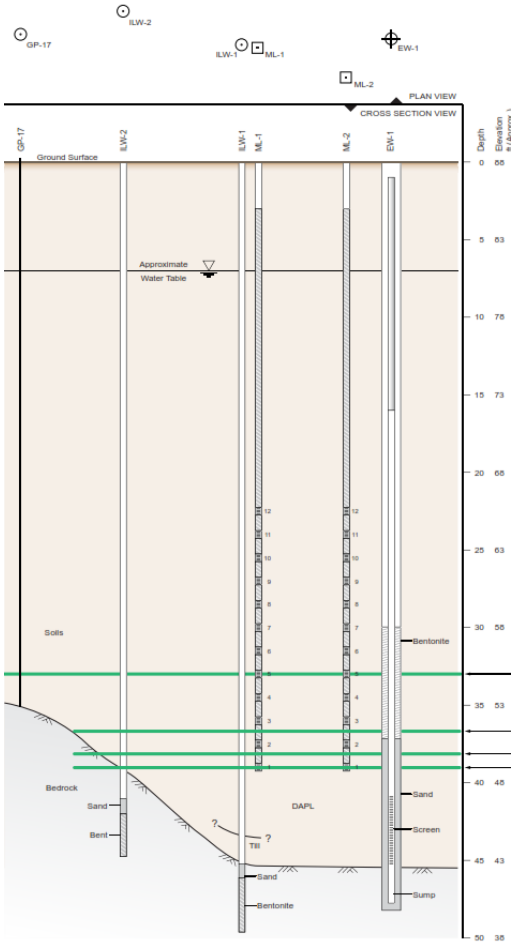
OPWD DAPL Pool

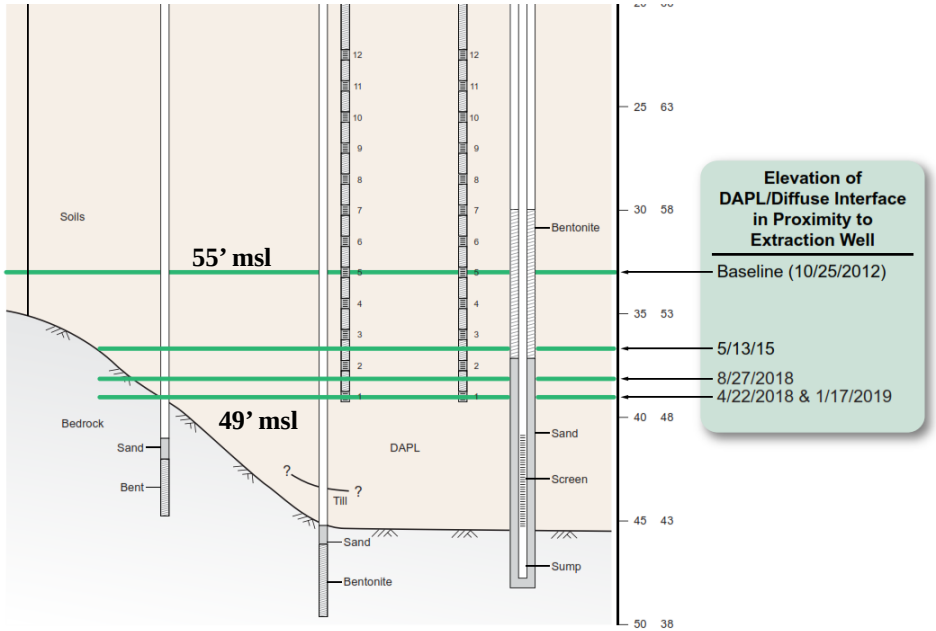
- Extraction system operating since 2012
  - Pilot test was completed in 2014
    - Pilot test report submitted to USEPA in Nov. 2014
  - Olin currently operating since 2015 to address source
    - System operations have been calibrated to ensure effective extraction of DAPL



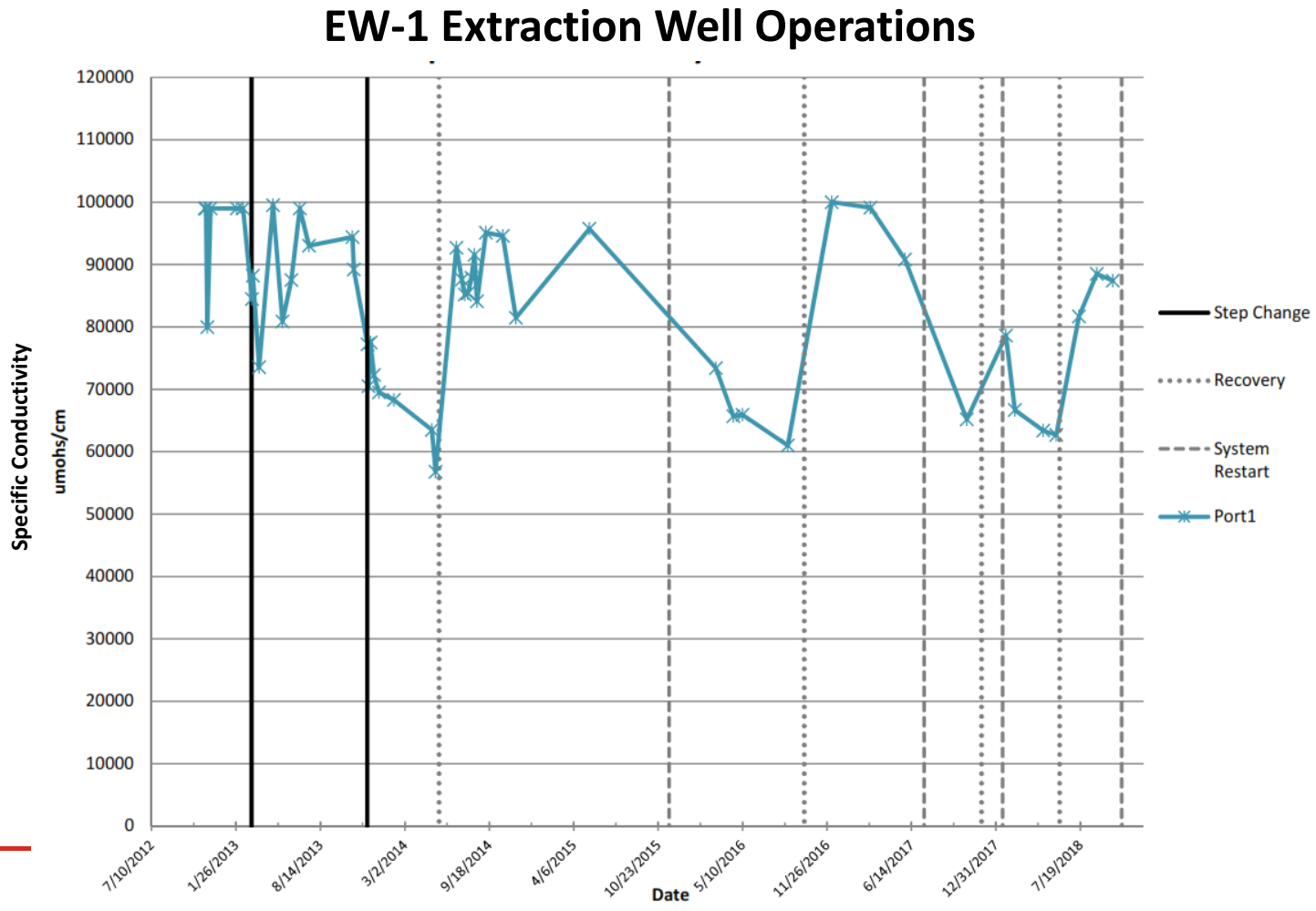
OPWD DAPL Pool

- Current understanding of DAPL pool elevations, geometry, and volume reasonably represents actual conditions
  - DAPL volumes estimated using elevations and extracted to-date match very well

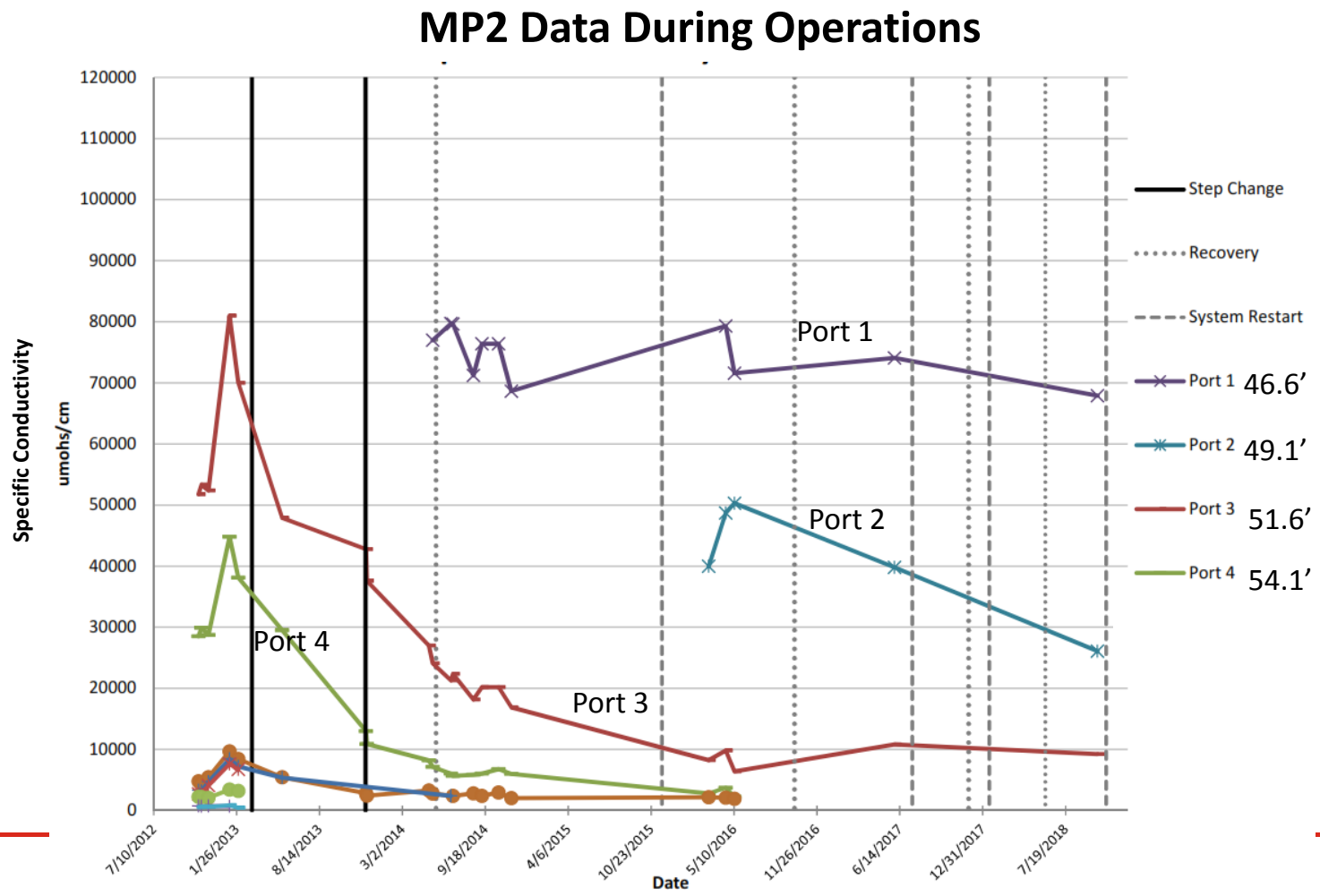




Pilot Extraction Progress: 2012-Present



Pilot Extraction Progress: 2012-Present



OPWD DAPL Pool – Proposed Next Steps

- Continue operating the system – No additional investigation currently anticipated
  - OPWD DAPL pool removal will be evaluated as part of the IAFS
  - Current system set-up (i.e., location of extraction well) appears to be optimal
    - Shorter well screen may promote better DAPL Extraction – DAPL elevations have declined since system start-up

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Discussion

Containment Area – CSM Differences

Olin CSM

- Containment Area part of corrective action – Not Source
  - Containment area functioning as designed
  - Groundwater and surface water quality Improving due to installation of Slurry Wall and Off-PWD DAPL Extraction
  - Chromium and ammonia (South Ditch surface water) are now Below OU1 SW PRGs
- Bedrock is competent with poor interconnection – prohibits migration of DAPL

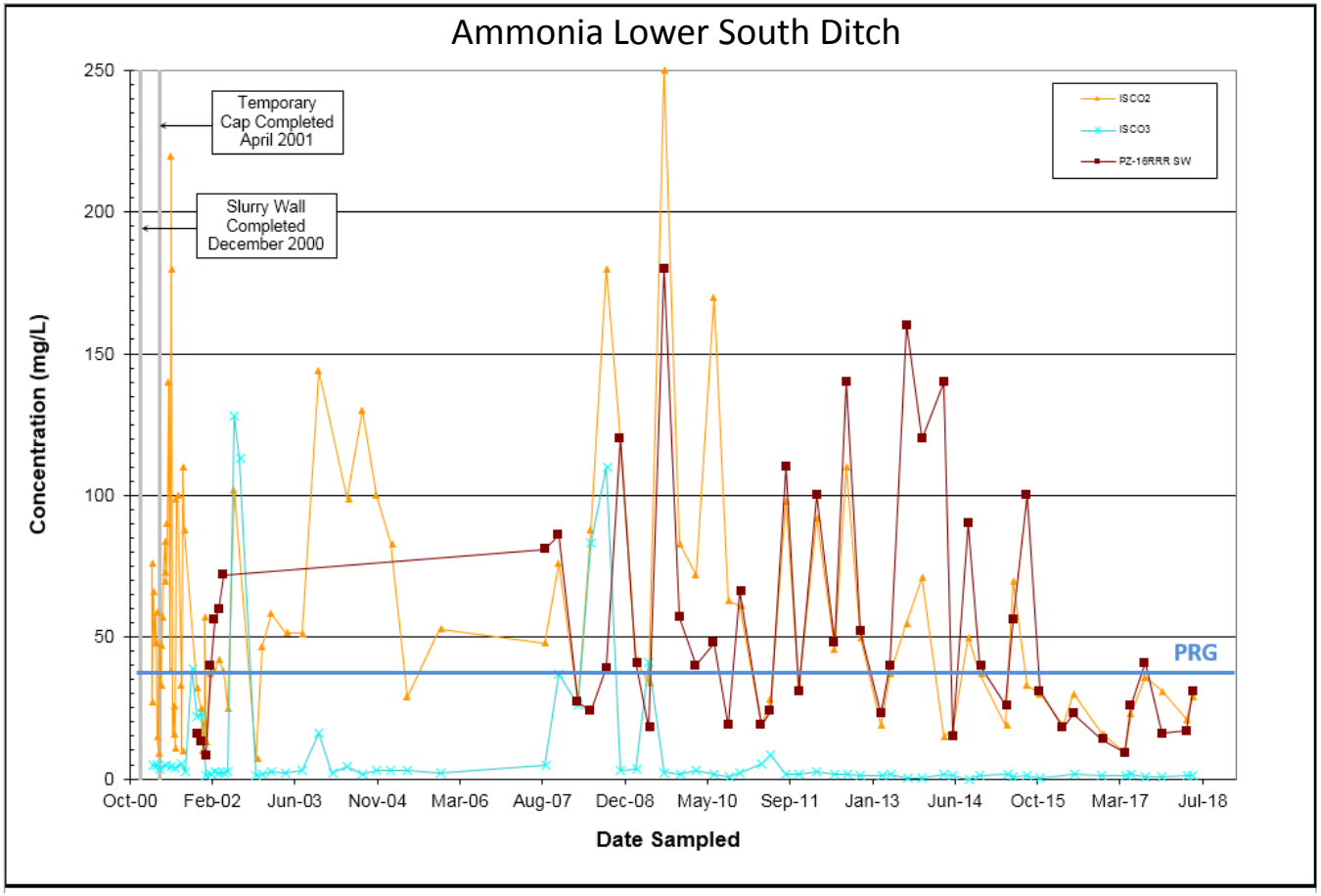
USEPA CSM

- Containment Area is not functioning as designed
  - Leaky and source of groundwater impacts including GW-202D and surface water
- Bedrock is fractured and transmissive – acts as a DAPL migration pathway

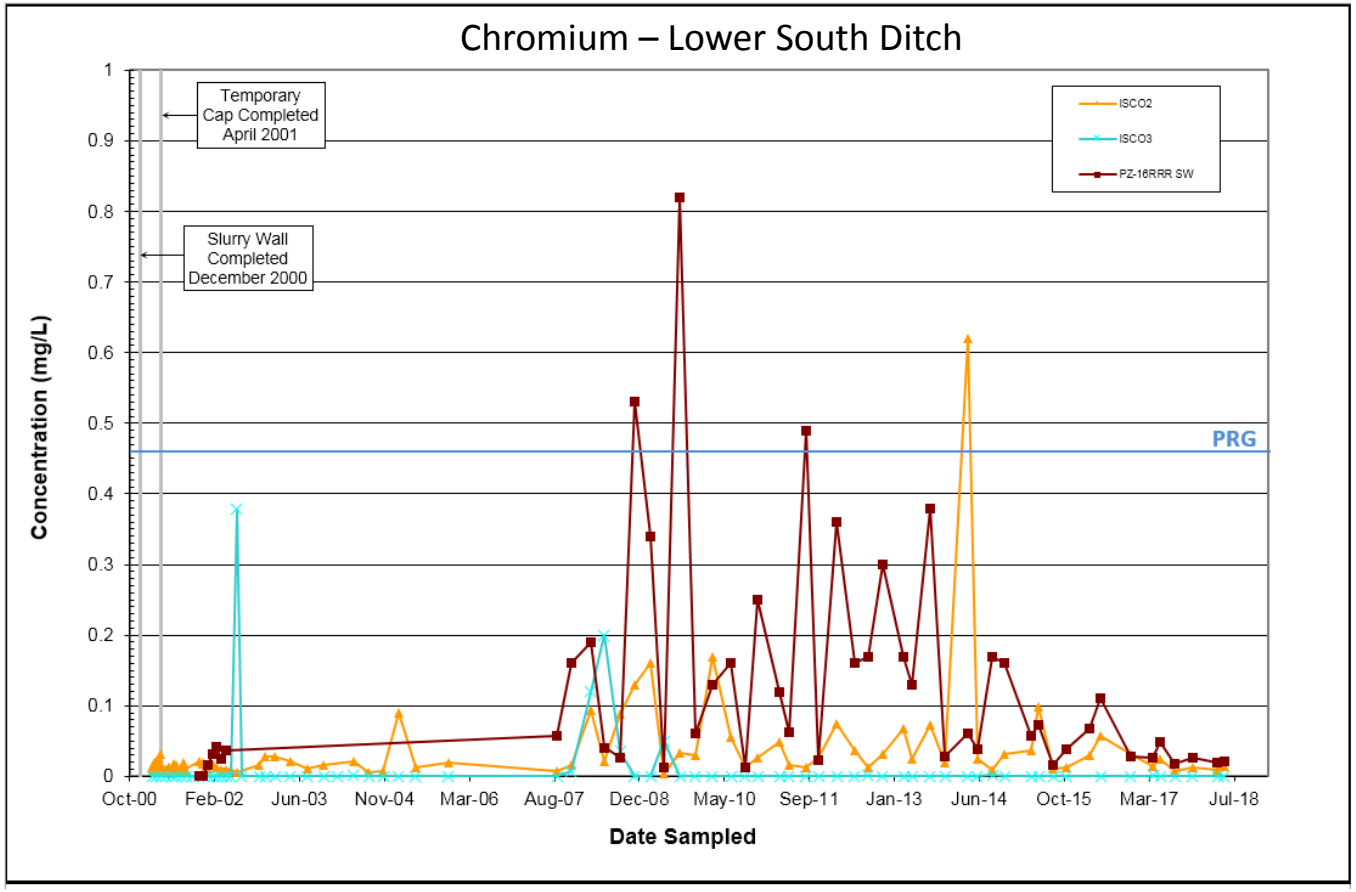
Containment Area

- No data currently exists that show diffuse groundwater within containment area is leaking/causing impacts to South Ditch
  - Containment Area is effective in containing migration of impacted groundwater (see larger plots)
  - Groundwater and surface water quality continues to improve since the installation of slurry wall
    - Ammonia and Chromium are below OU1 PRGs in south ditch
  - OPWD potential source of impact to south ditch (as acknowledged by MADEP) and is being addressed

Containment Area – South Ditch Surface Water Quality



Containment Area – South Ditch Surface Water Quality



Containment Area – Proposed Next Steps

- Containment area soils and DAPL pool will be evaluated in IAFS
  - OU1 FS concluded no risk for shallow soils in Containment Area
  - No soil in Containment Area identified as non-hazardous waste
- No further additional investigation currently anticipated in the vicinity of Containment Area

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Discussion

Maple Meadow Brook (MMB) Area – CSM Differences

Olin CSM

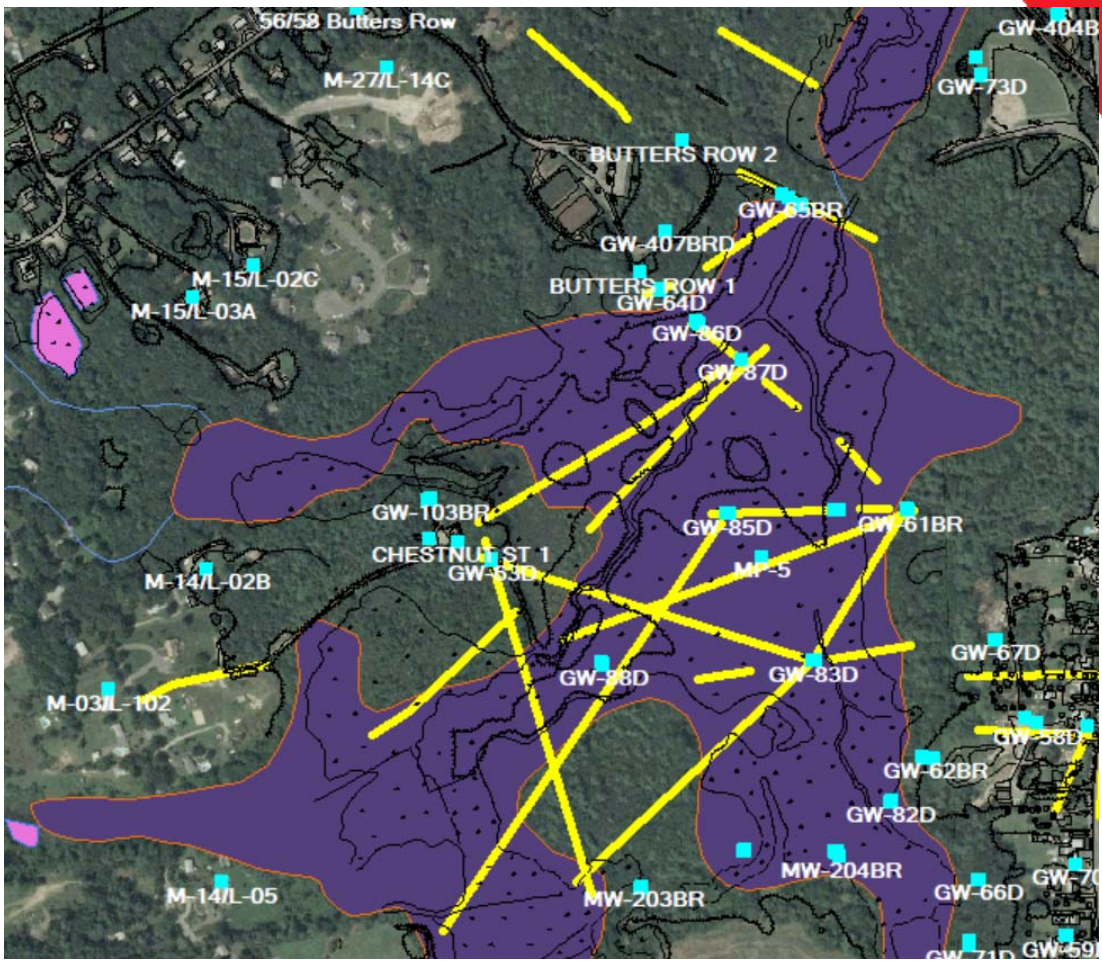
- Enough data available to explain CSM
  - Groundwater quality data continues to confirm CSM
- Bedrock is fractured

USEPA CSM

- Not enough data available
  - Additional groundwater quality data needed to verify CSM
- Bedrock is fractured

Maple Meadow Brook (MMB) Area

- MMB area has been characterized well – Have a clear understanding of system dynamics
  - 20 seismic investigations; 60 wells; 1 multi-port well
  - Migration mitigation evaluated as part of IAFS (NDMA = 11,000 ng/L)
    - Groundwater sampling for current conditions on-going
    - CSM will be verified with newer data
    - Matrix diffusion evaluation following source remedy (will be a controlling factor in overall remedy duration)
      - Additional data needs assessed after groundwater sampling



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Discussion